7x01 Θ

$5n + 3\sqrt[3]{n} + 1$

$c_1 n \leq \quad \leq c_2 n$

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$5n + 3\sqrt[3]{n} + 1$

$3\sqrt[3]{n} \leq 3n$

$1 \leq n$

$5n + 3\sqrt[3]{n} + 1 \leq 5n + 3n + n$

$n \leq \quad \leq 9n$

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$n^2 \quad n^3 \quad n^2 \in O(n^3)$

$\lim_{n \to \infty} \frac{n^2}{n^3} = 0 \quad \log n < \sqrt{n}$

$n \log n \quad n\sqrt{n}$

$\lim_{n \to \infty} \frac{n \log n}{n\sqrt{n}} = 0$

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$n^2 \quad n \Rightarrow 2n$

$(2n)^2 = 4n^2$

$\frac{4n^2}{n^2} = 4$

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```
Ans = 0
for i = 0
    i < n , i = i + 1
    for j = 0
        j < n ; j = j + 1
        Ans = Ans + i x j
return
```

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$$\text{Ans} = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} i \times j$$

$$Tc = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} 1$$

$$\sum_{i=0}^{n-1} n = n^2$$

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$$n^{2.5} > n^2 \log n$$

$$n^2 n^{0.5}$$

$$n^2 \sqrt{n}$$

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$x(n) = x(n-1) + 5$ for $n > 1$ $x(1) = 0$

$x(n-1) = x(n-2) + 5$

$x(n) = x(n-2) + 5 + 5$

$x(n-2) = x(n-3) + 5$

$x(n) = x(n-3) + 5 + 5 + 5$

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$x(n) = x(n-3) + 3 \times 5$

$x(n) = x(n-i) + i \times 5$

$n - i = 1 \Rightarrow i = n - 1$

$x(n) = x(1) + (n-1) \times 5$

$x(n) = 5(n-1)$

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$S(n) = 1^3 + 2^3 + \cdots + n^3$

$S(1) = 1$

- define the reccurent relation of $S(n)$

$$S(n) = \underbrace{1^3 + 2^3 + 3^3 + 4^3 + \cdots + (n-2)^3 + (n-1)^3}_{} + n^3$$

$S(n) = S(n-1) + n^3$

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```
S(n)
s = 0;
for i: 1 to n
    s = s + i×i×i;
end
return s;
```

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Algorithm $S(n)$

if $n = 1$ return 1

else return $S(n-1) + n \times n \times n$

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$M(n)$

$M(n) = M(n-1) + 3$

$M(n-1) = M(n-2) + 3$

$M(n) = M(n-2) + 2 \times 3$

$M(n) = M(n-\underline{3}) + \underline{3} \times 3$

$M(n) = M(n-i) + i \times 3$

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$M(n) = M(n-i) + 3i$

$M(1) = 0$

$n - i = 1 \Rightarrow i = n - 1$

$M(n) = M(1) + 3(n-1)$

$M(n) = 0 + 3(n-1)$

$M(n) = 3(n-1)$

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